REMARKS/ARGUMENTS

Claims 4 and 6 are pending in this application.

Claims 4 and 6 were rejected under 35 U.S.C. § 102(b) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Ogihara et al. (U.S. 4,898,641). Applicant respectfully traverses the rejection of Claims 4 and 6.

Claim 4 recites:

> **A lens** comprising:
> lithium tantalate including a lithium oxide and a tantalum oxide;
> wherein
> **a molar composition ratio of the lithium oxide and the tantalum oxide (Li_2O/Ta_2O_5) in the lithium tantalate is in a range of 0.975 to 0.982**; and
> **a birefringence of the lithium tantalate is in a range of -0.0005 to 0.0005**.

As described in paragraphs [0006] to [0008] of Applicant's originally filed Substitute Specification, lithium tantalate is well-known as a material for optical elements, such as a wavelength conversion element, an optical diffraction element, and a phase conjugate mirror. However, lithium tantalate has not previously been used for a lens because of a relatively large birefringence based on the difference of the refractive indexes between an ordinary ray and an extraordinary ray.

However, the inventors of the present invention discovered that the birefringence is greatly reduced in lithium tantalate having the composition recited in Applicant's Claim 4, and that lithium tantalate having the particular composition recited in Applicant's Claim 4 can preferably be used as a lens, especially usable for natural light and light coming from various angles. Specifically, the lens recited in Applicant's Claim 4 comprises lithium tantalate having a molar composition ratio of lithium oxide and tantalum oxide (Li_2O/Ta_2O_5) in a range of 0.975 to 0.982. The birefringence can be confined within a range of ±0.0005 in lithium tantalate having this particular molar composition ratio, whereas with a well-known stoichiometric composition or a congruent composition as the molar composition ratio of the lithium tantalate, the birefringence cannot be confined within a range of ±0.0005 in lithium tantalate.

In this manner, a miniaturized and thin lens utilizing a high refractive index (i.e., more than 2.0) of the lithium tantalate can be provided (see for example, paragraphs [0006], [0054], [0055] of Applicant's originally filed Substitute Specification and Figs. 4 and 5 of Applicant's originally filed drawings).

Furthermore, the lens as recited in Applicant's Claim 4 can be used not only for laser light that can generate a mono-dispersed wavelength, but also for natural light and light coming from various angles because it is not necessary to control the angle between incoming light and the optical axis of the lithium tantalite in advance (see, for example, paragraphs [0024], [0069] of Applicant's originally filed Substitute Specification). Since the confining angle between the incident direction of light and the optical axis is unnecessary with the lens recited in Applicant's Claim 4, an optical system can be freely designed more flexibly and at reduced costs.

The lens recited in Applicant's Claim 4 is capable of obtaining an increased effective diameter (NA) as compared to existing lenses, such as glass lenses, and thus, the brightness is increased (see, for example, paragraph [0058] and Table 1 of Applicant's originally filed Substitute Specification).

As a result, the effective aperture of the lens recited in Applicant's Claim 4 can be reduced as compared to existing lenses. Thereby, if the lens recited in Applicant's Claim 4 is used for optical electronic devices, such as an endoscope, a magneto optical disk, and a digital camera, the optical electronic devices can be miniaturized.

As shown from the relationship between the molar composition ratio and the refractive index in Fig. 2 of Applicant's originally filed drawings, the range of ±0.0005 of the birefringence can be achieved in lithium tantalate with a molar composition ratio that is deviated from the stoichiometric composition ((Li_2O/Ta_2O_5) =1.00).

The range of ±0.0005 of the birefringence in lithium tantalate can be achieved in a range of the molar composition ratio that is slightly shifted from the stoichiometric composition toward the Li deficient side. The range of ±0.0005 of the birefringence cannot be achieved with the well-known stoichiometric composition or with the congruent composition as the molar composition ratio of the lithium tantalate.

Ogihara et al. is directed to providing a single crystal wafer of lithium tantalate as a base material for manufacturing SAW devices having uniformly controlled quality and performance (see, for example, col. 1 line 65 to col. 2 line 8 of Ogihara et al.). To achieve uniform quality and performance, Ogihara et al. discloses that a range of variation of a value of double refraction of the single crystal wafer of lithium tantalate is set so as not to exceed $\pm 6 \times 10^{-4}$.

The Examiner alleged that the birefringence in a range of ±0.0005 recited in Applicant's Claim 4 corresponds to the range of variation of the value of double refraction of $\pm 6 \times 10^{-4}$ described in Ogihara et al. Applicant respectfully disagrees with the Examiner's allegation.

In contrast to the Examiner's allegation, the birefringence recited in Applicant's Claim 4 clearly corresponds to **the value of the double refraction** described in Ogihara et al., **NOT** to **the range of variation** of the value of double refraction described in Ogihara et al. In fact, the term "birefringence" is synonymous with the term "double refraction" (see, for example, http://www.thefreedictionary.com/birefringence).

Accordingly, Ogihara et al. merely discloses that the single crystal wafer of lithium tantalate has a double refraction value (birefringence value) in the range of 0.0039 ($4.5 \times 10^{-3} - 6 \times 10^{-4}$) to 0.0051 ($4.5 \times 10^{-3} + 6 \times 10^{-4}$) (see, for example, Claim 1 of Ogihara et al.). Thus, contrary to the Examiner's allegations, Ogihara et al. neither teaches nor suggests that the single crystal wafer of lithium tantalate could or should have a value of double refraction in a range of ±0.0005. With reference to Double refraction and Range of variation of double refraction on Table 1 of Ogihara et al., it is readily apparent that every value of double refraction disclosed in Table 1 of Ogihara et al. is greater than the birefringence in a range of ±0.0005 recited in Applicant's Claim 4 by a factor of 10.

In addition, the single crystal wafer of lithium tantalate having a double refraction value in the range of 0.0039 ($4.5 \times 10^{-3} - 6 \times 10^{-4}$) to 0.0051 ($4.5 \times 10^{-3} + 6 \times 10^{-4}$) disclosed in Ogihara et al. substantially corresponds to the existing lithium tantalate having a

birefringence of about 0.006 as described in a paragraph [0008] of Applicant's originally filed Substitute Specification.

The Examiner alleged, "Ogihara [et al.] is silent on the ratio of lithium oxide and tantalum oxide. It is noted that the birefringence is substantially identical to the instant claim and depends on the ratio of lithium oxide and tantalum oxide. Therefore, the composition would not have mutually exclusive properties MPEP 2112.02II. Therefore the claimed ratio is assumed to be inherent to the composition of Ogihara et al." Applicant respectfully disagrees.

Since, as described above, Ogihara et al. clearly fails to teach or suggest that the single crystal wafer of lithium tantalate could or should have a double refraction value (birefringence value) that is anywhere near the range of ±0.0005 as recited in Applicant's Claim 4, the composition of Ogihara et al. would most certainly not inherently include the feature of "a molar composition ratio of the lithium oxide and the tantalum oxide (Li_2O/Ta_2O_5) in the lithium tantalate is in a range of 0.975 to 0.982" as recited in Applicant's Claim 4.

Thus, Ogihara et al. clearly fails to teach or suggest the feature of "a molar composition ratio of the lithium oxide and the tantalum oxide (Li_2O/Ta_2O_5) in the lithium tantalate is in a range of 0.975 to 0.982" as recited in Applicant's Claim 4.

Furthermore, although Ogihara et al. discloses that the range of variation of the value of double refraction of the single crystal wafer of lithium tantalate should be minimized in order to stabilize the quality and performance of the SAW devices, Ogihara et al. certainly does not recognize or address the problem of the value of double refraction itself being large because Ogihara et al. does not contemplate using the single crystal wafer of lithium tantalate for a lens.

Accordingly, Ogihara et al. fails to recognize the problem described in Applicant's originally filed Substitute Specification with respect to using lithium tantalate for a lens and provides no suggestion whatsoever to reduce the value of double refraction/birefringence.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of

the rejection of Claims 4 and 6 under 35 U.S.C. § 102(b) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over Ogihara et al.

In view of the foregoing remarks, Applicant respectfully submits that Claim 4 is allowable. Claim 6 depends upon Claim 4, and is therefore allowable for at least the reasons that Claim 4 is allowable.

In view of the foregoing remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

To the extent necessary, Applicant petitions the Commissioner for a Two-Month Extension of Time, extending to October 12, 2010 (October 10, 2010 falls on a Sunday and October 11, 2010 falls on a federal holiday), the period for response to the Office Action dated May 10, 2010.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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/Christopher A. Bennett #46,710/
Attorneys for Applicant

KEATING & BENNETT, LLP
1800 Alexander Bell Drive, Suite 200
Reston, VA 20191
Telephone: (571) 313-7440
Facsimile: (571) 313-7421

Joseph R. Keating
Registration No. 37,368

Christopher A. Bennett
Registration No. 46,710